

connecting the pyramidal bump electrodes to pad electrodes of the semiconductor device;

*cont
C*

said step of forming the plurality of pyramidal bump electrodes including;
a step of forming etched holes by anisotropically etching a base material having a crystal orientation, and

a step of filling up the etched holes by plating a metal.

35. A method of producing a semiconductor device according to claim 34, wherein between said step of forming etched holes and said step of filling up the etched holes, further includes

a step of forming a primary film of the same material as the metal for said plating of the metal on said base material having a crystal orientation and on a side surface of each of said etched holes, thereby filling up the etched holes by plating the metal by using said primary film.

36. A method of producing a semiconductor device according to claim 34, wherein before said step of forming said etched holes, further includes
a step of forming a first pattern having opening portions at positions corresponding to the etched holes by etching a first oxidized film formed on said base material having the crystal orientation, and

a step of forming said etched holes by using the first pattern as a mask.

37. A method of producing a semiconductor device according to claim 34,

wherein said step of forming the plurality of pyramidal bump electrodes includes;

a step of forming a first pattern having opening portions at positions corresponding to the etched holes by etching a first oxidized film formed on said base material having the crystal orientation, and

cont
a step of forming said etched holes by using the first pattern as a mask,

a step of removing the first oxidized film,

a step of forming a second oxidized film anew on the etched holes, and

a step of filling up the etched holes by plating a metal.

38. A method of producing a semiconductor device according to claim 34, wherein after said step of filling up the etched holes by plating a metal, further includes a step of forming a gold plated film on the metal plated film.

39. A method of producing a semiconductor device according to claim 37, wherein after said step of filling up the etched holes by plating a metal, further includes a step of forming a gold plated film on the metal plated film.

40. A method of producing a semiconductor device according to claim 34, wherein in said step of filling up the etched holes by plating a metal, Ni is plated as said metal to fill up the etched holes.

41. A method of producing a semiconductor device according to claim 37,

wherein in said step of filling up the etched holes by plating a metal, Ni is plated as said metal to fill up the etched holes.

42. A method of producing a semiconductor device according to claim 34, wherein in said step of filling up the etched holes by plating a metal, Cu is plated as said metal to fill up the etched holes.

43. A method of producing a semiconductor device according to claim 37, wherein in said step of filling up the etched holes by plating a metal, Cu is plated as said metal to fill up the etched holes.

44. A method of producing a semiconductor device according to claim 34, wherein after said step of connecting the pyramidal bump electrodes to pad electrodes of the semiconductor device, further includes a step of forming a gold film on a surface of the pyramidal bump electrodes.

45. A method of producing a semiconductor device according to claim 37, wherein after said step of connecting the pyramidal bump electrodes to pad electrodes of the semiconductor device, further includes a step of forming a gold film on a surface of the pyramidal bump electrodes.

46. A method of producing a semiconductor device according to claim 35,

wherein in said step of forming a primary film, a Cr film is formed as said primary film for metal plating, and then a Ni film is formed on the Cr film.

47. A method of producing a semiconductor device according to claim 46, wherein in said step of connecting said pyramidal bump electrodes to pad electrodes of the semiconductor device, said pyramidal bump electrodes are transferred from the base material having the crystal orientation to the pad electrodes by removing said Cr film.

48. A method of producing a semiconductor device according to claim 34, wherein in said step of connecting said pyramidal bump electrodes to pad electrodes of the semiconductor device, after transferring the pyramidal bump electrodes from the base material having the crystal orientation to the pad electrodes, a step is further included to form a gold film on the surface of the pyramidal bump electrodes.

49. A method of producing a semiconductor device according to claim 37, wherein in said step of connecting said pyramidal bump electrodes to pad electrodes of the semiconductor device, after transferring the pyramidal bump electrodes from the base material having the crystal orientation to the pad electrodes, a step is further included to form a gold film on the surface of the pyramidal bump electrodes.

cont

50. A method of producing a semiconductor device according to claim 34, wherein in said step of connecting said pyramidal bump electrodes to pad electrodes of the semiconductor device, said pyramidal bump electrodes and the pad electrodes of the semiconductor device are thermally compressed at 200°C to 300°C, and the pyramidal bump electrodes and the pad electrodes of the semiconductor device are electrically connected through conductive particles connected in an anisotropic conduction sheet.

51. A method of producing a semiconductor device according to claim 34, wherein in said step of connecting the pyramidal bump electrodes to pad electrodes of the semiconductor device, gold stud bumps formed on the pad electrodes of said semiconductor device and the pyramidal bump electrodes are thermally compressed thereby connecting by forming an alloy.

52. A method of producing a semiconductor device according to claim 34, wherein in said step of connecting the pyramidal bump electrodes to pad electrodes of the semiconductor device, a Ni film and a gold film formed on the pad electrodes of said semiconductor device, and the pyramidal bump electrodes are thermally compressed thereby connecting by forming an alloy.

53. A method of producing a semiconductor device comprising the steps of:

forming a plurality of pyramidal bump electrodes of the semiconductor device;
and

connecting the pyramidal bump electrodes to pad electrodes of the
semiconductor device;

Wnt
C
said step of forming the plurality of pyramidal bump electrodes including:

a step of forming a first pattern having openings at positions corresponding to
etched holes by etching a first oxidized film formed on a surface of a base material
having a crystal orientation,

a step of forming said etched holes by using the first pattern as a mask,

a step of removing the first oxidized film,

a step of forming a second oxidized film anew on the etched holes,

a step of forming a plated feeding film on the base material having the crystal
orientation and on a side surface of each of the etched holes,

a step of forming a second pattern of an organic material on the base
material having the crystal orientation so that the etched holes are not covered,

a step of filling up the etched holes by plating a metal film on the plated
feeding film,

a step of forming a gold plated film on the metal film, and

a step of removing the second pattern of the organic material.--